

REMARKS/ARGUMENTS

This case has been carefully reviewed and analyzed in view of the Official Action dated 20 September 2006. Responsive to the rejections made in the Official Action, Claims 1 and 6 have been amended to clarify the language thereof and the combination of elements which form the invention of the subject Patent Application. Additionally, Claims 2, 3, 7 and 8 have been amended to provide consistency with the amendments made to Claims 1 and 6, and Claims 4, 5 and 9 have been cancelled by this Amendment.

In the Official Action, the Examiner rejected Claims 1-9 under 35 U.S.C. § 112, first and second paragraphs, as the Examiner felt that a number of expressions of the previously amended claims were not supported by the original Specification, and therefore constituted new matter. Further, those expressions as well as several others were considered by the Examiner to be unclear as to what was covered by the recitations, and the Examiner questioned how the second physical or chemical change was different from the first physical or chemical change, how the layers were stacked, how a connection between the layers are formed, and how adding additional material causes a change.

It is believed that the amendments to Claims 1 and 6 identifies the intent of what is covered, and where necessary, expressions have been changed to be more clear, and the newly used expressions are believed to be fully supported by the original Specification. In particular, the term “activating” has been changed to --

initiating --. It is respectfully submitted that the subject Patent Application is a translation from a foreign (Chinese) language document and thus appears to contain a number of translational, grammatical and idiomatic errors, and thereby more difficult to understand than would otherwise be expected. However, on page 3, lines 13-15 Step 2 is defined as “**proceeding** a first time of physical or chemical change” (emphasis added). The term “proceed” is defined in Webster’s 9th New Collegiate Dictionary as including “... to begin and carry on an action, process ...”. Thus, what is being described in Step 2 is the initiation of the first physical or chemical change. Such is likewise set forth with respect to Step 3. Accordingly, the term -- initiating -- now set forth in the Claims is believed to be fully supported in the Specification, as filed, by its use of the term “proceeding.”

Turning now to the Detailed Description, beginning on page 5, and the Drawings, a base material is deposited and exposed to one of several different forms of energy, or exposed to (placed in contact with) a second material in order to effect a physical or chemical change that converts the base material to a “gelled material”. As defined in Step 3, selected areas are exposed to a laser or another material that effects a second physical or chemical change, hardening the exposed gelled material in the selected areas. Therefore, there is no requirement to claim first and second selected areas, and such has been eliminated from the Claims. In order to differentiate the base material from the material which added to effect a chemical change, such has been claimed as a -- material composition --, which is

believed to be fully supported by the Specification, since a material may be defined as a composition, and the term simply is used to distinguish the added material from the base material. The added material composition may function as a catalyst for the conversion of the gelled material to become hardened, in the areas in which it is applied, or it may combine with the gelled material to form a hardened compound in the areas to which it is applied. As such catalytic and two-part reactions are well known in the art, it is believed that one skilled in the art would have a full understanding of the type of chemical change produced by the adding of an additional material (or material composition), sufficient to make and/or use the invention.

The terminology “different from the first” has been cancelled from the Claims, and the Claims now make clear that the second physical or chemical change represents the change of the gelled material in the selected areas to become “hardened in nature”. The terms “stacked sectional layers” and “forming a connection between the layers” have also been cancelled from the Claims. As defined on page 3 of the original Specification, lines 19-21, the layers produced by Step 3 in each repetition of the process produces a 3-dimensional object by “laminating” the layers. The process of laminating inherently defines the layers as being stacked, and adhered one to the other. In the conversion of changing the gelled material to a hardened form, one layer adheres to the next, and such is defined in the Specification through the use of the term “laminating”.

It is believed that the Claims, as now amended, contain limitations which are fully supported by the Specification, as filed. Further, it is believed that the amended Claims define the invention in such clear and concise terms that one skilled in the art is able to make and use the invention. Further, it is believed that the Claims now particularly point out and distinctly claim the subject matter that Applicant regards as the invention.

In the Official Action, the Examiner rejected Claims 1-9 under 35 U.S.C. § 103(a), as being unpatentable over Schmidt, et al., U.S. Patent 6,841,589, in view of Murphy, et al., U.S. Patent 4,945,032.

Before discussing the prior art relied upon by the Examiner, it is believed beneficial to first briefly review the method of the invention of the subject Patent Application, as now claimed. The invention of the subject Patent Application is directed to a method of forming objects. The method includes the steps of spreading a base material layer on a surface by a nozzle, and then initiating a first physical or chemical change of the base material layer by exposure to one of ultraviolet beams or infra-red beams, the base material layer thereby becoming a gelled material. The method then includes the step of initiating a second physical or chemical change by application of a laser beam to selected areas of the gelled base layer. Alternately, as defined in Claim 6, that step is defined by initiating a second physical or chemical change by adding a material composition to selected areas of the gelled base material layer. The second physical or chemical change,

by either method, is a change to the gelled material at each selected area to become hardened in nature. Still further, the method includes repeating steps 1 through 3 a pre-determined number of times. Each newly added base material layer is laminated on a preceding layer to form a plurality of stacked layers. The hardened selected areas of the plurality of stacked layers defining a solid object. Additionally, the method includes the step of removing the portions of the base material layers remaining in gelled form after initiation of the second physical or chemical change to obtain a final prototype.

In contradistinction, the Schmidt, et al. reference is directed to an ultra-violet light curable hot melt composition. The hot melt composition, in a liquefied stated (maintained at an elevated temperature) is selectively dispensed to form the layer of an object and then allowed to cool to subsequently solidify in a first physical change. Next, the solidified material is subjected to ultraviolet light in order to cure the material, make its solidified nature permanent.

Thus, nowhere does the reference disclose or suggest having a base material layer on a surface that is larger than the area of the object that is being formed, where a first physical or chemical change of the base material layer is initiated by exposure of one of ultraviolet beams or infra-red beams, the base material layer thereby becoming a gelled material, as now claimed. In fact the reference teaches away from that method by the dispensed material being solidified responsive to removal of the application of heat to the base material.

The reference also fails to disclose following the gelling step by initiating a second physical or chemical change by application of a laser beam for the addition of a material composition to selected areas of the gelled material layer, the second physical or chemical change being a change to the gelled material at each selected area to become hardened in nature, as now claimed. Further, as the reference forms the actual prototype by the lamination of multiple layers, it fails to disclose the step of removing the portions of the base material layer remaining in gelled form after initiation of the second physical or chemical change to obtain a final prototype, as claimed.

The Murphy, et al. reference does not overcome the deficiencies of Schmidt, et al. The Murphy, et al. reference is directed to a stereo lithography method using repeated ultraviolet exposures to increase strength and reduce distortion of prototypes formed thereby. In the method disclosed in this reference, a liquid polymer is exposed to near ultraviolet radiation in a particular pattern to form a layer of a 3-dimensional object. The initial exposure converts the polymer to a gel and subsequent exposures continues the polymerization to form a hardened structure. Thus, here again, the chemical or physical change takes place only to the selected areas being irradiated and thus does not provide for the initiation of a first physical or chemical change of the base material layer and then the step of initiating a second physical or chemical change by application of a laser beam (or material composition) to selected areas of the gelled base material layer,

as now claimed. The formation of the object layers within the mass of gelled material helps in maintaining stability and structural integrity of the layers during the laminating process. As an initial thin overhanging layer is formed, the underlying gelled material provides support therefore, which support is only required until the subsequently applied lamination supply the necessary structural integrity.

Thus, even if it were possible to replace the application of the hot melt process wherein the material is cooled to solidify the composition with a photo curable resin, which through chemical irradiation with the appropriate light source would result in a transition first to a gel then to a hardened nature, such would still only be applied to areas which represent the corresponding layer of the object. Both the gelling and hardening steps are applied to the total area of the layer and does not provide the hardening step to only **selected areas of the gelled material**. Neither Schmidt, et al. nor Murphy, et al. provide any motivation for providing a base material which is first gelled by application of either ultraviolet or infra-red radiation and then exposing only selected areas of the gelled material to a second source of radiation or application of a material composition which initiate a chemical or physical change to the selected areas to change the gelled material at each selected area to become hardened in nature, as now claimed. Clearly, both references teach away from the method of the invention of the subject Patent Application.

As neither Schmidt, et al. nor Murphy, et al., either alone or in combination, disclose or suggest the concatenation of method steps which form the invention of the subject Patent Application, they cannot make obvious that invention. Therefore, it is now believed that the subject Patent Application has been placed in condition for allowance, and such action is respectfully requested.

Respectfully submitted,
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10 January 2007

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